

DISCUSSION OF THE AMENDMENT

Claims 1-2 and 5-26 are active in the present application. Claims 3 and 4 are canceled claims. Claims 23-26 are new claims. Support for new Claims 23 and 24 is found in original Claim 4. Support for new independent Claim 25 is found in previously presented Claim 1. New independent Claim 25 is intended to be a substantial duplicate of previously presented Claim 1. Claim 1 is amended herein to include the limitations of previously pending Claims 3 and 4. Further support for the amendment to Claim 1 is found on pages 25 and 26 of the original specification. Support for new Claim 26 is found in the paragraph bridging pages 25 and 26 of the specification.

No new matter is added.

REMARKS

Independent Claim 1 is now drawn to a method that includes a heating/removal process that comprises heating a silicon wafer and etching a top surface of the silicon wafer with a solution that comprises at least one of an alkaline hydroxide and an alkaline carbonate. Independent Claim 1 has been amended to include the limitations of previously pending Claims 3 and 4.

In the Office Action of November 2, 2007 the Office rejected Claim 4 over a combination of Lawrence (3,923,567); Falster (U.S. 6,100,167); and Chai (U.S. 5,837,662), i.e., the prior art relied on by the Office. The Office relied on Chai for a teaching of carrying out a chemical removal step using an alkaline hydroxide and/or an alkaline carbonate. The Office admits that Lawrence and Falster do not disclose this aspect of present Claim 1:

The combination of Lawrence and Falster et al. does not expressly teach that the chemical removal step can be performed using alkaline (i.e., basic) hydroxides and/or alkaline carbonates.

See the last paragraph on page 6 of the November 2 Office Action.

The Office cites that column 4, lines 4-12 of Chai as support for the assertion that Chai teaches a chemical removing step carried out with an alkaline hydroxide and/or an alkaline carbonate. The Office further cites to column 4, lines 24-34 as evidence that one of ordinary skill in the art would be motivated to modify Lawrence and Falster using the chemical removal step of Chai. The Office acknowledges that the basis for modifying Lawrence and Falster lies in Chai's disclosure that the surface potential of the silicon wafer can be changed such that contaminants may be electrostatically repelled from the surface of the silicon wafer (see the second full paragraph on page 7 of the November 2 Office Action).

Chai discloses the following in this regard:

The alkaline bath aids in the cleaning process by changing the surface potential of the silicon wafer, thus causing

the surface of the wafer to electrostatically repel silica and other particulate impurities which may be present.

Chai's chemical removal step is different from the heating/removal process recited in the present claims. The heating/removal step of the present claims includes etching a surface of the silicon wafer. Chai does not disclose or suggest that any portion of the prior art silicon wafer can be removed by the chemical step cited by the Office in the Chai disclosure. In fact, Chai describes this step of the prior art process as one that does no more than change the surface potential of the silicon wafer such that the silicon wafer can electrostatically repel particulate contaminants.

Applicants submit that the chemical removal process of present Claim 1 is different from the cleaning process described at column 4, lines 24-27 of Chai and cited by the Office as motivation for modifying Lawrence and Falster to arrive at the subject matter of previously presented Claim 4. Applicants submit that the prior art relied on by the Office does not disclose or suggest the presently claimed invention because the prior art relied on does not disclose a chemical removal process such as that presently claimed wherein a surface of a silicon wafer is etched such that a portion of the silicon material is removed.

The alkaline bath of Chai is merely used as a washing step whereby the surface potential of the silicon wafer is changed to repel contaminant particles. In contrast, the chemical process of present Claim 1 is one in which the top surface of the silicon wafer is etched such that a portion of the silicon wafer is removed by the alkaline hydroxide and/or alkaline carbonate solution.

Applicants submit that the prior art relied on by the Office does not disclose or suggest all of the limitations of present Claim 1. Applicants respectfully request withdrawal of the rejection and the allowance of Claim 1 and those claims dependent therefrom.

Claim 25 is a new independent claim. New independent Claim 25 is substantially identical to previously presented independent Claim 1. Applicants submit that the subject

matter of new independent Claim 25 remains patentable over the prior art relied on by the Office for the reasons of record and further for the reasons discussed herein below.

In the Amendment filed in the present case on August 10, 2007, Applicants argued that those of ordinary skill in the art would have no motivation to combine Lawrence and Falster to arrive at the invention of previously presented Claim 1. Applicants pointed out the contradictory strategies employed by Lawrence and Falster to treat silicon wafers. These contradictory strategies included the use of n-type versus p-type reagents in the respective processes and (ii) substantial differences in the temperatures at which the Lawrence and Falster processes treat the prior art silicon wafer. The Office responded in the November 2 Office Action on pages 8-10.

First, it appears that the Office is of the opinion that (i) those of ordinary skill in the art would be motivated to combine Lawrence and Falster and/or (ii) those of ordinary skill in the art would have a reasonable expectation of success when modifying Lawrence in view of Falster or vice versa because each of the Lawrence and Falster prior art “are concerned with removing contaminants” (see page 8, lines 11-12 of the paragraph bridging pages 8 and 9). Applicants submit that this ignores substantial differences between the Falster and Lawrence processes. One process uses a gettering step that includes adding an n-type dopant to the prior art silicon wafer (Lawrence). The other process uses an annealing step using a boron based reagent, e.g., an p-type dopant (Falster).

The Office’s logic that the cited prior art may be combined simply makes no sense. Modifying Lawrence in the manner of Falster or modifying Falster in the manner of Lawrence is in fundamental contradiction to the explicit descriptions of the processes provided in the prior art relied on by the Office. Applicants submit that modifying the process of Lawrence in the manner of Falster or vice versa would render the respective

processes inoperable. In this regard Applicants draw the Office's attention to MPEP

§ 2143.01(V) which states, in part:

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. (Citations omitted).

Applicants further draw the Office's attention to MPEP § 2143.01(VI) which states, in part:

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. (Citations omitted).

Each of the above-quoted sections of the MPEP makes it absolutely clear that the Office's guidelines prohibit basing a rational of obviousness on the combination of two references whose modification would either render the prior art inoperable or change the principle of the operation of the prior art. The Office's suggestion to combine Lawrence and Falster in the present application violates this administrative guideline of the Office. Thus, the Office's rejection of the present claims over the combination of Falster and Lawrence is not supportable and should be withdrawn.

For example, Lawrence requires the use of phosphorous in a gettering step to remove impurities from the prior art silicon surface. The Office provides no explanation whatsoever how boron may be used in place of phosphorous to achieve the same result. In fact, phosphorous and boron are completely different elements, one is a p-type dopant whereas the other is an n-type dopant. There is no information of record showing that p-type and n-type dopants are equivalent or may be exchanged and yet provide the same result.

The Office even appears to acknowledge the incompatibility of Lawrence and Falster (see page 9 of the November 2 Office Action). For example:

Thus, Examiner maintains that it would have been obvious to one of ordinary skill in the art, informed by Falster et al.'s teaching that a heating step comprising heating the silicon wafer at 100-300°C for a preferred time of several [sic] to several tens of minutes up to about 1.5 hours. (Column 3, line 61 – column 4, line 10) diffuses copper to the surface of the silicon wafer without the undesirable copper precipitates that form when the heating is performed at higher temperatures (Column 2, Line 67 – Column 3, Line 50), and informed by Falster et al.'s teaching that such a heating step is preferable over processes including gettering as taught by Falster et al.'s prior art, since the high diffusivity of copper and silicon makes it possible for copper to escape from the gettering sites and reach the device region of the wafer (Column 1, Line 64 – Column 2, Line 3), would have been motivated with a reasonable expectation of success to modify the method as taught by Lawrence to replace the heating step taught by Lawrence with the heating step of Falster et al., for the predictable result of removing contaminants from the p-type wafer.

As a whole the office's logic makes no sense and is contradictory on its face. On the one hand it appears that the Office is suggesting that the Lawrence process can be modified by substituting the Falster heating step for the Lawrence heating step. This is in direct contradiction to the explicit disclosure of Lawrence which states that a gettering step must be carried out at above 1000°C is necessary for the prior art process. The Office's suggested modification renders Lawrence inoperable and/or changes Lawrence's principle of operation.

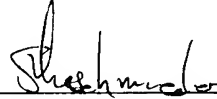
As already stated above, the Office's logic in this regard is contradictory to the Office's administrative guidelines as presented in MPEP § 2143.01(V)-(VI).

The combination of Lawrence and Falster to render the presently claimed invention obvious is therefore not supportable. The rejections made in view of the combination of Lawrence and Falster should therefore be withdrawn and new independent Claim 25 should be allowed.

For the reasons discussed above in detail, Applicants request withdrawal of the rejections and the mailing of a Notice Allowance acknowledging the patentability of the presently claimed subject matter.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



Stefan U. Koschmieder, Ph.D.
Registration No. 50,238

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)